

CORRECTED VERSION

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
6 October 2005 (06.10.2005)

PCT

(10) International Publication Number  
**WO 2005/092037 A2**

(51) International Patent Classification: **Not classified**

(21) International Application Number:  
PCT/US2005/009383

(22) International Filing Date: 22 March 2005 (22.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/555,109 22 March 2004 (22.03.2004) US

(71) Applicant (for all designated States except US): **RE-  
SEARCH FOUNDATION OF THE CITY UNIVER-  
SITY OF NEW YORK [US/US]; 555 West 57th Street,  
11th Floor, New York, NY 10019 (US).**

(72) Inventors; and

(75) Inventors/Applicants (for US only): **AREND, Mark**

[US/US]; 55 #3 Rector Place, Red Bank, NJ 07701 (US).  
**CROUSE, David [US/US]; 75 West End Avenue, Apt  
R19A, New York, NY 10023 (US).**

(74) Agents: **FEIT, Irving, N. et al.; Hoffmann & Baron LLP,  
6900 Jericho Turnpike, Syosset, N.Y. 11791 (US).**

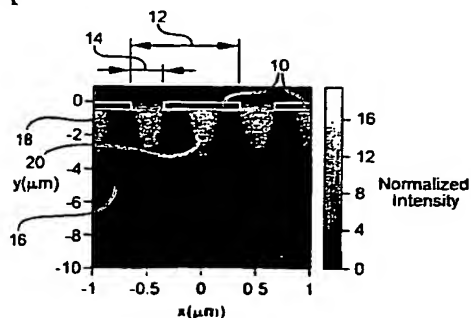
(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ,  
TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA,  
ZM, ZW.

(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

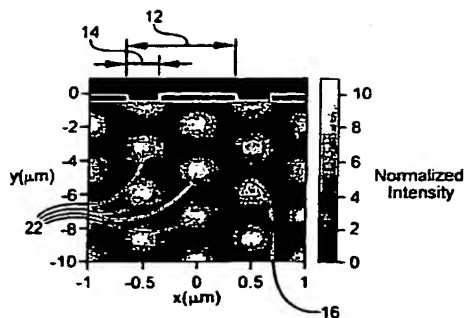
(54) Title: **HIGH RESPONSIVITY HIGH BANDWIDTH METAL-SEMICONDUCTOR-METAL OPTOELECTRONIC DEVICE**

A



(57) Abstract: An optical device for sensing an incident optical wave within a wavelength range includes a first array and a second array of electrodes superposed on a substrate, and a sensor connected to the contacts. The arrays are interdigitated. Each array includes its own parameters: contact width, contact thickness, groove width, and a groove dielectric constant. A structure associated with the arrays resonantly couples the incident wave and a local electromagnetic resonance or hybrid mode including at least a surface plasmon cavity mode (CM). For coupling the CM, an aspect ratio of contact thickness to spacing between electrodes is at least 1. A preferred structure for coupling a hybrid mode for high bandwidth and responsivity includes a higher dielectric constant in alternating grooves. The substrate may include silicon, including silicon-on-insulator (SOI). An SOI device having a alternating grooves with a higher dielectric, e.g., silicon oxide, provides .25 A/W and 30 GHz bandwidth.

B



BEST AVAILABLE COPY

WO 2005/092037 A2



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(48) Date of publication of this corrected version:

3 November 2005

(15) Information about Correction:

see PCT Gazette No. 44/2005 of 3 November 2005, Section II

**Published:**

— without international search report and to be republished upon receipt of that report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*